

NASA TECH BRIEF

Marshall Space Flight Center



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Self-Sterilizing Polymers

There have been a number of attempts to produce coatings or additives that will result in a self-sterilizing material. The best results have been achieved with materials incorporating a volatile disinfectant. The usefulness of such a mixture is maximized if there is some way of controlling the sterilizing action.

Certain organic resins and polymers are known to release potentially sterilizing quantities of gaseous formaldehyde when heated above ambient temperatures. After the investigation of several compounds, it was found that the polymer, paraformaldehyde, was the most effective sterilizing additive. Using this additive for a particular application (a self-sterilizing potting and encapsulating compound) an effective germicidal system has been formed.

The addition of approximately 1% paraformaldehyde to a room temperature vulcanizing (RTV) potting polymer results in an effective, controllable germicide. At ambient temperatures, the rate of sterilization is slow; at 60° C, internal bacterial spore count is reduced from 10^5 to zero in twelve hours. The rate at which the sterilization occurs depends on the relative humidity, the temperature, the substrate, and the presence of other chemicals. Temperature and humidity are the most important factors.

The paraformaldehyde releases dry formaldehyde which is a more effective germicide than formaldehyde

and water. In the presence of water, a certain amount of formalin, a less effective germicide, is produced. Furthermore, the dry formaldehyde can penetrate enclosed areas and packages, will not damage material, and leaves no permanent residue.

Note:

Quantitative information is available on this and other self-sterilizing systems. Requests for further information may be directed to:

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Patent status:

NASA has decided not to apply for a patent.

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